2.0 AFFECTED ENVIRONMENT

2.1 Project Area

The general project area is comprised of the two county area of northwest Illinois which includes Jo Daviess and Stephenson Counties. The project area extends from just west of Illinois Route 84, northwest of the city of Galena to approximately 47 miles to the east near Bolton Road, northwest of the city of Freeport. The project area is primarily agricultural, with pockets of residential and commercial development. Concentrated areas of residential and commercial development are located within the corporate limits of Galena, the Galena Territory, Freeport and the villages of Elizabeth, Stockton and Lena. Although the project area is agriculture in nature, the area is experiencing increased patronage to the recreational facilities and residential communities, which serve as second homes for an increasing number of residents from the greater Chicago Metropolitan Area.

2.2 Transportation Facilities

Roadway Facilities

Existing Roadway Facilities

U.S. Route 20 provides interstate service to the motoring public. Two transcontinental through routes are parallel and in proximity to U.S. Route 20, namely, Interstate Route 80, generally to the south, and Interstate Route 90, generally to the north. However, at Rockford, Interstate 90 deviates from its general east-west orientation and proceeds north through Madison into central Wisconsin, at which point it returns to an east-west orientation. As a result, U.S. Route 20 in Jo Daviess and Stephenson Counties is separated from Interstate Route 90 by approximately 100 miles. Meanwhile, Interstate Route 80 is approximately 75 miles south of this area. The nearest interstate highway to this area is Interstate Route 88, approximately 50 miles south of Stockton, an alternate route to I-80, and largely a tollway, for travel between the Quad Cities and Chicago. Therefore, U.S. Route 20 is the only major east-west roadway that serves Jo Daviess and Stephenson Counties.

Proposed Roadway Facilities

There has been a formal interest in modernizing U.S. Route 20 in northwestern Illinois since the interstate system took form. The Department is currently studying the upgrade of U.S. Route 20 from East Dubuque to Illinois Route 84 from a four-lane expressway to a freeway. At the eastern terminus of the project area, the Freeport Bypass is currently a two-lane roadway. The Department has plans to complete the staged construction of the bypass to a four-lane freeway. Resurfacing, rehabilitation, and restoration (3R) type improvements are ongoing along U.S. Route 20, and the Department will continue to do so. No other major improvements are proposed in the project area.

2.3 Social/Economic

Social Characteristics

Jo Daviess County is the northwestern most Illinois county having a population of 22,289 with having 98.7 percent white and 0.3 percent minority population[3]. The median income for the county was $48,335.

Stephenson County located next to Jo Daviess to the east has a population of 48,979 of which 89.3 percent is white and has a 7.8 percent minority population. The median family income was $40,510.

Galena is situated in western Jo Daviess County, which forms the northwestern corner of Illinois, bordering on Wisconsin to the north and the Mississippi River to the west. This city of 3,460 residents is rich in history with the home of the 18th President of the United States, Ulysses S. Grant and 85 percent of Galena listed in the National Register of Historic Places. The population consists of 98 percent white and 0.8 percent minority. The median family income was $44,063.

The village of Elizabeth, population 682, is nestled in the middle of the rolling hill country of scenic Jo Daviess County. Of the 682, 99 percent is white with a 0.3 percent minority population. The median family income was $41,173.

The township of Woodbine, located just east of Elizabeth, has a population of 577, of which 99.3 percent is white. The minority population is 0.5 percent. The median family income for Woodbine was $31,403.

The village of Stockton is located in the eastern portion of Jo Daviess County with a population of 1,926. The population consists of 99.7 percent white and 0.1 percent minority. The median family income was $43,173.

Lena is located approximately 9 miles west of Freeport, Illinois and in western Stephenson County. The population of Lena is 2,887 with 98.6 percent white and 0.3 percent minority. The median family income of Lena was $49,375.

The city of Freeport, located in the center of Stephenson County, had a population 26,443. Of this 26,443, 81.8 percent is white and 15 percent is minority. The median family income was $43,787.

Public Services and Facilities

Each city or village within the project area operates its own police and fire protection. For police services, unincorporated and rural areas are protected by the Jo Daviess or Stephenson County Sheriff's departments. For fire protection, fire districts are set up to incorporate rural and unincorporated areas in each county. In Jo Daviess County, the Galena-Strauss Hospital and Nursing Care Facility offers a 29-bed hospital and 60 long-term care beds. In Stephenson County, a 171-bed hospital is located in Freeport.

Public schools in Jo Daviess, Stephenson and Carroll Counties are operated under the jurisdiction of the Regional Office of Education. Each city or village within the project area has a

[3] All census data is from the U.S. Census Bureau, Census 2000.

public school district. **Figures 2-1 and 2-2 of the Draft EIS depict the locations of the public facilities in the project area.**

Economic Characteristics

Jo Daviess County is predominantly rural in nature. Economically, the county has had three basic export industries, each of which reflects a different economic period in America. Mining began during the first half of the 19th century, but little of this employment still exists in the project area. Agriculture has been the mainstay of the county's economy for over 100 years, with dairying and beef cattle production being the main focus. The third industry, manufacturing, emerged primarily after World War II, in the form of foundries and other similar facilities. The county's newest industry is recreation and tourism.

Stephenson County is also predominantly rural. Established in 1837, early economic activity in the county consisted of agriculture and fur trading. Industry in the county is concentrated in the City of Freeport, the county seat, although many of the smaller communities also have some industrial operations. The leading industries in the county include agriculture, food manufacturing and processing (including milk and milk products), lumber and wood products and agricultural services. Agriculture is the county's major industry, largely because of the high percentage of productive soils, favorable climate and good transportation facilities. Incorporated communities located within the project area include the village of Lena and the city of Freeport. Lena is a small farm village that provides services to the immediate rural community, while Freeport is the retail and manufacturing hub of Stephenson County.

Incorporated communities located within the project area include the city of Galena and the villages of Elizabeth and Stockton. In the early 1800s, Galena became the lead mining center of the country, as well as a major river port and center for commerce. Many of the buildings of the day survive to the present, which has resulted in the city's designation as a National Historic District and being placed on the National Register of Historic Places. Elizabeth is the center of the county's agricultural economy, serving as a major distribution point for livestock feed, fertilizer, agricultural limestone and fuel. Also located in Elizabeth are the majority of the food, clothing, appliance and hardware facilities that are utilized by the county's farming community. Stockton is also an important farm community, albeit on a smaller scale than Elizabeth. Manufacturing is important to Stockton as it is the birthplace of the Kraft Company.

Jo Daviess County had a nearly 13 percent decrease in labor force from 1980 to 1990, and then a 19.4 percent increase from 1990 to 2000, resulting in a 4.0 percent increase between 1980 and 2000. Compared to Jo Daviess County, Stephenson County experienced a steady decline in labor force during the two periods: a 2.5 percent decrease from 1980 to 1990 and a 0.6 percent decrease from 1990 to 2000. The labor force situation in the two counties between 1980 and 2000 was largely attributed to the population decline during the same period. In fact, from 1980 to 2000, total population dropped by 5.2 percent for Jo Daviess County and by 1.1 percent for Stephenson County.

Overall, the unemployment rates for the two counties and the state had been steadily declining since the mid 1980s despite a small increase in the early 1990s. From 1980 to 2000, the unemployment rates fell from 8.8 to 4.4 percent for Jo Daviess County and from 7 to 6.3 percent for Stephenson County, compared to the decline from 8.3 to 4.4 percent for the State of Illinois.

The differences in employment characteristics between the two counties are reflected in the geographical mobility and place of work for their resident workers. According to the Census data, in 2000, Jo Daviess County had 38.5 percent of its residents working outside the county, including 24.5 percent of its residents working outside the State of Illinois.

Unlike Jo Daviess County, the majority of residents in Stephenson County (79.6 percent) were employed inside the county in 2000.

Between 1989 and 1999, real median household income rose modestly in both Jo Daviess and Stephenson Counties and in the State of Illinois. Median household income increased for both Jo Daviess and Stephenson Counties by 10.0 percent and 4.2 percent respectively, compared to a 5.7 percent increase for the State of Illinois. Among the municipalities in Jo Daviess and Stephenson Counties, only Elizabeth experienced a decrease in median household income (5.7 percent), while Galena had the largest rise in median household income at 17.9 percent.

With respect to poverty, in the 2000 U.S. Census, 682 households in Jo Daviess County (7.4 percent) reported income below the poverty level ($17,029 for a family of four), while in Stephenson County the figure was 1,807 households (9.1 percent).

Land Use and Development Trends

Currently, U.S. Route 20 is the principal highway connecting the cities of Rockford and Chicago to the east and the city of Dubuque, Iowa to the west. The largest land use patterns in the project area are agricultural and undeveloped lands. Existing land use patterns in the project area have also been largely influenced by topographic features. Although residential land use exists throughout the project area to varying degrees, areas of concentrated residential development are located near the developed centers along the U.S. Route 20 corridor, such as in the city of Galena, the Galena Territory and the villages of Elizabeth and Stockton.

In July 2000, Stephenson County revised its Future Land Use Plan, while Jo Daviess revised its Future Land Use Plan on September 14, 1999. Of the individual communities within the project area, only the city of Galena prepared a comprehensive plan. The Comprehensive Plan of Galena was prepared in 1991 and updated in April 2003. This plan encouraged the restoration and residential reuse of structures within the historic residential neighborhood as well as new residential development on existing platted and serviced lots before new residential subdivisions. The city of Freeport has not updated its current comprehensive plan. However, according to local planning officials, the latest Freeport Comprehensive Plan is considered to be consistent with the goals and objectives of the latest Stephenson County Comprehensive Plan.

Population projections through the year 2020 for Jo Daviess County show only a two percent overall change in population. Although the population is not expected to increase substantially, Jo Daviess County has been experiencing a considerable increase in residential development catering to the second homebuyer.

For Stephenson County, the overall increase in population through the year 2020 is projected to be approximately one percent. Unlike Jo Daviess County, Stephenson County does not have a substantial second home market. Therefore, according to the county, little land use change is expected throughout the county. Stephenson County is organized into sixteen districts within the five broad categories of agricultural, residence, business, manufacturing, and tourist districts. For much of the county, agricultural land predominates although much of the land throughout the county is considered floodplain. Most residential zoning within the project area is located within Freeport and Lena.

2.4 Agriculture

The proposed project lies within an area that is predominantly agricultural in nature and has been farmed or grazed since the mid-1800s. The farming and dairy industries in Jo Daviess and Stephenson Counties are an important economic force as well as an important life-style. Of the 160,249 hectares (395,985 acres) in Jo Daviess County, farmland comprises about 72 percent and of the 147,111 hectares (363,520 acres) in Stephenson County, farmland comprises about 85 percent. Within the project area, over 54 percent of the land is agricultural, while an additional 26 percent of the land is considered as scattered agricultural land (pasture and hayfields). Prime farmland accounts for 26 and 40 percent of the land in Jo Daviess and Stephenson Counties, respectively. In addition, important farmland accounts for 40 and 12 percent of the land in Jo Daviess and Stephenson Counties, respectively.

The Farmland Protection Act of 1981 protects prime farmland, as defined by U.S. Department of Agriculture (USDA), excluding land already in or "committed" to urban development or water storage and excludes all farmland within the official 2.4-kilometer (1.5-mile) planning area of an incorporated municipality. Only Galena and Freeport, of the affected municipalities within the project area, meet the conditions of this act. The project also considered Centennial and Sesquicentennial Farms. Three farms in the project area qualify as Centennial Farms. No farms qualify as Sesquicentennial Farms.

Coordination with the Illinois Department of Agriculture (IDOA) and the Natural Resources Conservation Service (NRCS) are contained in Appendix A and has been ongoing since the beginning of the project. The IDOA requested that the EIS contain information that was included in their 10 September 1993 letter. This information was addressed in the Agricultural Resources Technical Report and summarized in the Draft and Final EIS. In the IDOA letter dated 29 May 2001, IDOA stated that the Department has done a very thorough job of assessing the project's agricultural impacts. The Department requested that the NRCS, and subsequently the IDOA, complete the AD-1006 form in August 2001. Results of the AD-1006 may be found in Section 4.2 of this FEIS.

2.5 Cultural Resources

Over 1,618.7 hectares (4,000 acres) of the project area have been surveyed to date (this excludes areas which were disturbed, wetlands, and properties where access was denied). Of the 222 archaeological sites, which have so far been recorded in the project area, 77 percent are isolated finds of prehistoric stone tools and prehistoric lithic scatters confined to the disturbed plow zone. Historic period archaeological sites recorded include abandoned lead mines, the remains of 19th Century farmsteads, and a 19th Century pottery works. Hundreds of pits and tailings piles have been found in unglaciated uplands around Galena and underscore the early importance of lead mining in this area of northwestern Illinois.

Some 300 historic period standing structures in the project area have been photographed, and initial determinations concerning National Register eligibility have been made by professional architectural historians so that properties which are potentially meaningful can be avoided during project planning (as depicted in Appendix N of the DEIS). Three historic buildings currently listed on the National Register are located in the project area. These properties, all situated between Freeport and Lena, consist of examples of a particular architectural type of round barn which dates to the late 19th Century. Two historic period Euro-American cemeteries also have been recorded in the project area.

2.6 Air Quality

All areas of Illinois are currently in attainment of the standards for four of the six criteria pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. For the 1-hour ozone standard, Chicago is classified as a severe nonattainment area and Jersey, Madison, Monroe, and St. Clair Counties are classified as maintenance areas for that standard. The Chicago nonattainment areas include Cook, DuPage, Kane, Lake, McHenry, and Will Counties, Aux Sable and Goose Lake Townships in Grundy County, and Oswego Township in Kendall County.

For the 8-hour ozone standard, Cook, DuPage, Lake, McHenry, and Will Counties, Aux Sable and Goose Lake Townships in Grundy County and Oswego Township in Kendall County, have been designated as moderate nonattainment areas. Jersey, Madison, Monroe, and St. Clair Counties in the St. Louis area also have been designated as moderate nonattainment areas for the 8-hour ozone standard.

The Lake Calumet area and Lyons Township in Cook County have been designated as nonattainment for the particulate matter (PM_{10}) standard. In addition, Oglesby and several adjacent townships in LaSalle County, and Granite City and Nameoki Township in Madison County have been designated as maintenance areas for the PM_{10} standard. The sources of particulate matter that promoted the nonattainment and maintenance classifications are unrelated to transportation. All other areas of Illinois currently are in attainment for the ozone and PM_{10} standards. No portion of this project is located within a designated nonattainment area or maintenance area.

2.7 Noise

Traffic noise impact and abatement analyses were conducted in accordance with the procedures as set forth in the FHWA's *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, 23 Code of Federal Regulations (CFR) Part 772; reissued FHWA Policy and Guidance document dated June 1995; and the Department's *Procedures for Highway Project Noise Analyses*, April 3, 2000. The FHWA Noise Abatement Criteria (NAC) in 23 CFR Part 772, and the substantial noise level increase over existing noise level criteria (14 dBA) in the Department policy, were used to identify and evaluate any noise impact. The traffic noise level predictions and noise mitigation analyses were performed using FHWA's *Highway Traffic Noise Prediction Model* (Report No. FHWA-RD-77-108) and the *STAMINA 2.0/OPTIMA Noise Barrier Cost Reduction Procedure* (Report No. FHWA-DP-58-1).

Generally, noise sensitive receptors correspond to existing or future planned noise sensitive developments (or groups of noise sensitive receptors as defined in 23 CFR Part 772), which are likely to be affected by changes in traffic volumes and design along U.S. Route 20 and the proposed interchanges and intersections.

Noise sensitive receptors include schools, hospitals, churches, playgrounds and recreation areas, residential areas, Section 4(f) areas, etc. (i.e., Activity B land uses according to FHWA's NAC in 23 CFR, Part 772) in the project area. Noise sensitive receptors generally comprise clusters of these types of noise-sensitive land uses, and may sometimes include more than one of these uses.

A total of 23 locations for existing noise level monitoring were identified along existing and proposed U.S. Route 20. These monitoring locations were selected as representative locations along the Alternates.

In order to establish baseline data, existing daytime noise levels were measured at each of the 23 locations. Land use categories for the 23 measured receptor sites, all of which fall into FHWA's Activity Category B, are distributed as follows: seven residential sites, one school, two nursing homes, two hotel/motels, and 11 farm houses. These 23 measured locations were distributed along the existing and proposed Freeway and Expressway Alternates in a manner that allowed existing and future noise levels to be estimated for each Alternate. **Table 2-11 of the DEIS presents the monitored sound levels for these sites. Receptor 5, missing from Table 2-11 of the DEIS, is listed below.**

	Monitoring Receptor Location	Monitor Location	Adjacent To	Time Period	Measured Sound Levels, L_{eq}, dBA	Approach or Exceeds NAC 67 dBA
Area 3	5	Residence on US Route 20 in Stockton	WB US Route 20	AM	60	No
				Weekend	56	No

2.8 Natural Resources

The geologic setting of the project area includes Cambrian through Silurian bedrock on the flanks of a regional structural high (Wisconsin Arch) which is overlain with unconsolidated Quaternary deposits. The bedrock deposits are sedimentary rocks (sandstone, siltstone, shale, limestone, and dolomite); and surficial beds are unconsolidated. **The area of Jo Daviess and Carroll Counties occur within the driftless area (unglaciated) and Jo Daviess County also lies within an area of karst topography.**

Geology

Bedrock and Structural Geology

The top of the Precambrian basement in the project area is at an elevation between 305 and 457 meters (1000 and 1500 feet) below mean sea level. In northern Stephenson County, it is primarily a biotite granite and granitic gneiss. The Paleozoic bedrock stratigraphy of the project area consists of Silurian, Ordovician, and Cambrian age sedimentary units **(Table 2-13 and Figure 2-3 of the DEIS)**. From oldest to youngest rocks, these units are: Mt. Simon Sandstone, Eau Claire Formation, Galesville Sandstone, Ironton Sandstone, Knox Group, Ancell Group (includes the St. Peter Sandstone), Ottawa Supergroup (includes the Platteville Group and Galena Group), Maquoketa Group, Hunton Supergroup.

The project area lies on the Wisconsin Arch, a regional structural high that extends southeast from central Wisconsin into Illinois. This arch borders the Illinois Basin, a structural depression covering six states, which lies to the south. There are no major fault systems in the project area.

Surface Geology and Topography

The bedrock sequence is directly overlain with Quaternary deposits related to Pleistocene glacial advances and retreats (glacial till, meltwater outwash, loess, ancient soil horizons) and post-glacial Holocene processes (alluvial and colluvial processes, modern soil formation, and human activities). There have been at least two Pleistocene glacial stages in Illinois: Illinoian and Wisconsinan (latest). The Wisconsinan glacial episode did not reach the project area. Illinoian glaciers, however, advanced from the east as far as Stockton. Thus, surficial units between Stockton and Freeport consist of tills deposited directly by Illinoian glaciers while tills

are absent in the area from Stockton to Galena. This is depicted on Figure 2-4 (Surface Geology) of the DEIS.

The entire project area lies within the Central Lowlands physiographic province of the United States. The proposed alignments traverse two physiographic divisions of the state of Illinois: the Driftless Section (Galena to Stockton) and the Rock River Hill Country Subsection of the Till Plains Section (Stockton to Freeport).

The seven most prevalent soil types (out of 57) underlying the Alternates in Jo Daviess and Stephenson Counties are mapped by the NRCS soil surveys as Downs silt loam**,** Dunbarton-Dubuque silty clay loam, Fayette silt loam, Lacrescent silt loam, Palsgrove silt loam, Rozetta silt loam, and Tama silt loam. These soils make up between 72 percent and 77 percent, depending on the alternate selected, of all the soils in the proposed right of way for U.S. Route 20. All soil discussions are taken from the above-mentioned soil surveys.

Many of the soils in the project area are classified as highly erodible soils. These are soils that have slopes of four percent or greater. These soils generally occur along waterways in the project area and where slopes of up to 50 percent are encountered. These soils are listed in Table 2-14 (Highly Erodible Soils) of the DEIS.

Mineral Resources

Mineral resources in the project area include limestone, dolomite, sand, gravel, zinc and lead. Five active quarries (near existing U.S. Route 20 west of Elizabeth, West Galena, East Galena on West Stagecoach Road, near Wentzel Mound 9 miles north of Elizabeth, and west of Stockton) produce crushed rock for use as aggregate in concrete, road-base stone for bituminous road surfaces, riprap, and agricultural lime. There are no known active zinc-lead mines in the project area, though abandoned mines are present. The locations of quarries and abandoned mines within the project area were depicted on Figure 2-7 of the DEIS.

Karst Terrain

The prominence of carbonate rocks (limestone and dolomite) at or near the land surface makes the project area susceptible to the development of karst solution features **(Figure 2-1: Carbonate and Non-Carbonate Bedrock in Relation to U. S. Route 20 Sections, Jo Daviess and Stephenson Counties, Illinois)**. The driftless area is one of five regions in Illinois where karstic features are concentrated. **The Driftless Karst Area includes all of Jo Daviess County and the western half of Carroll County (Panno and Weibel 2003; Webb, Taylor, and Krejca 1994). Known karst features in the project area include caves, springs, and sinkholes (Figure 2-2: Karst Features in Relation to U. S. Route 20 Sections, Jo Daviess and Stephenson Counties). As can be seen in Figure 2-2, the particularly well-developed karst features occur southwest of the project area. In the project area, karst features tend to be comparatively small. Sinkholes are generally round and measure a few tens of feet in diameter. Roadcuts along major highways expose solution-enlarged crevices in the rocks (Panno and Weibel 2003).** Sinkholes are associated with the Silurian dolomite at the Longhollow Observation Tower on U. S. Route 20 west of Elizabeth.

Enlargement of existing fractures and the development of interconnected solution cavities by karstification make the carbonate bedrock of this area an important aquifer. However, because of the rapid recharge of karst aquifers, they are also very susceptible to contamination from surface sources. **Aquifer sensitivity is defined as the ease with which a contaminant of any kind applied on or near the land surface can migrate to an aquifer (Berg 2001); aquifers are**

classed as A (very high) through E (low) sensitivity. (Figure 2-3: Aquifer Sensitivity Classifications In Relation to U. S. Route 20 Sections, Jo Daviess County, Illinois). The depth, thickness, and geologic character of an aquifer are considered when classifying aquifer sensitivity, along with special factors such as karst, which is considered the environment most sensitive to contamination.

Land Subsidence and Landslides

Unique surface geological conditions that exist in the project area have led to the development of **land subsidence (occurs when large amounts of groundwater have been withdrawn from Karst features and fine-grained sediments. The rock compacts because the water is partly responsible for holding the ground up. When the water is withdrawn, the rocks fall in on itself.) and** landslide prone areas. In the driftless area of Jo Daviess County, bedrock is at or near the ground surface. The shale is less resistant to erosion than the overlying dolomite. Preferential erosion of shale units removes support for overlying units. Rock creep (the continual movement of boulders at barely perceptible rates) also occurs. The area surrounding U.S. Route 20 west of Elizabeth between the Apple River and the Longhollow Observation Tower has been mapped as an area of slumping and landsliding, predominantly as rock creep, where dolomite blocks are creeping downward on a shale slope. Geological conditions elsewhere in the project area, e.g., shallow bedrock overlain by loess and/or glacial till, and loess or glacial till overlying paleosols (ancient soil horizons), also create landslide prone conditions.

Groundwater Resources

Water-yielding aquifer units can be found in unconsolidated sand and gravel, sandstone, or dolomite and limestone. Sand and gravel aquifers are generally restricted to areas of moderately thick glacial deposits in the bedrock valleys associated with the Pecatonica River near Freeport and Yellow Creek near Stockton. Important bedrock aquifers are Silurian dolomites perched atop the Maquoketa confining unit (shale); limestone and dolomite units in the upper Maquoketa Group; the Galena-Platteville unit; and the St. Peter Sandstone.

The Illinois State Geological Survey (ISGS) identified over 170 private wells within 305 meters (1,000 feet) of the alternates. No public water wells were found within 305 meters (1,000 feet) of the alternates. However, there may be wells near the project alignment that are not included in any database. Most water in the area investigated by ISGS is obtained from limestone aquifers at depths ranging about 21 meters to 162 meters (70 to 530 feet) (ISGS, 2001). As of May 2001, there are no USEPA designated Sole Source Aquifers in or near the project area.

The following municipalities within the project area use groundwater wells to supply drinking water: Stockton, Freeport, Eleroy, Galena, Lena, Woodbine and Elizabeth. None of these municipalities uses surface water resources to supply drinking water.

Groundwater Quality

A Preliminary Environmental Site Assessment (PESA) was conducted by ISGS along the alternates. This area was characterized as a high risk for the occurrence of hazardous materials based on the presence of potentially hazardous compounds at fourteen locations. At present, all sites may be sources of contamination to groundwater. In addition, farmland with applied pesticides and fertilizers are also potential sources of contamination to groundwater.

Karst aquifers are particularly susceptible to contamination from surface sources **because of the fractured and honeycombed bedrock and the absence of a thick soil cover.**

According to the Illinois Water Quality Report (IEPA, 2002), water quality data obtained from the Community Water Supply Network wells in the project vicinity are classified as "full use support." This designation indicates that no detections occurred in organic chemical monitoring data and inorganic constituents assessed were at or below background levels for the groundwater source being utilized.

2.9 Surface Water Resources and Water Quality

The project area crosses two major river basins of Illinois, the Upper Mississippi River Basin and the Rock River Basin. The streams in both of these basins drain to the Mississippi River. Land cover in these watersheds are dominated by agricultural (row crop, pasture, hayfield), forest and developed (urban and built-up) lands.

Surface Water Resources

Water resources in the project area consist of streams, lakes, ponds, and wetlands. A total of 28 streams and their tributaries were assessed within the project area. As determined from the U.S. Geological Survey topographic maps most of the streams in the project area have permanent flow. The physical, biological and chemical parameters of these streams are identified in Tables 2-16 and 2-18 of the Draft EIS.

The major streams in the project area are the Galena River, Smallpox Creek, Furnace Creek, Apple River, Yellow Creek and Pecatonica River. Four of these streams have been rated by the Illinois Environmental Protection Agency (IEPA)/Illinois Department of Natural Resources (IDNR) Biological Stream Characterization (BSC) Workgroup. The BSC is a multi-tiered stream quality classification based primarily on the attributes of the lotic fish communities. The classification ranges from A (unique aquatic resource) to E (restricted aquatic resource). Furnace Creek, Yellow Creek, and the Pecatonica River have a BSC rating of C (moderate aquatic resource). The Apple River has a BSC rating of B (highly valued aquatic resource). The Galena River and Smallpox Creek are not rated. The reach of the Apple River between Wolf Creek and Mill Creek is also listed as a 'Biologically Significant Stream' by the Illinois Natural History Survey (1992).

Two of the streams in the project area are listed as candidate streams because of their wild and scenic qualities. Approximately 83 kilometers (52 miles) of the Apple River and 133 kilometers (83 miles) of the Pecatonica River are listed on the Nationwide Rivers Inventory (NRI) compiled by the National Park Service. River segments on this list potentially qualify as national wild, scenic or recreational rivers. The NRI sections of the Apple River extend from its mouth to Hanover and from Hanover to the Wisconsin State line. These sections are listed due to the Outstandingly Remarkable Values (ORVs) of scenery, recreation and geology. The NRI describes it as a pleasant stretch of river, flowing through hill and farm county with a scenic natural setting with smallmouth bass and trout fishing. **The Apple River, from its topographic divide in Wisconsin to its mouth at the Mississippi River near Savannah is 55 miles in length. Approximately 17 river miles upstream of the project area lies Apple River Canyon State Park. Approximately 223,000 people visited this site in 2002 (IDNR 2003). The river downstream of the park is used for fishing (moderate use) and canoeing and floating (light use). Apple River Road, from Elizabeth northeastward, traverses the east side of the river and has moderate use during the fall for viewing fall colors.** The NRI sections of the Pecatonica River extend from its mouth northwest of Freeport to McConnel Road. These sections are listed on the NRI due to the ORVs of scenery and recreation. The river is described as a scenic stream flowing mainly through farm country with rolling hills. **The project does not cross the Pecatonica River.**

Figure 2-1: Carbonate and Non-Carbonate Bedrock in Relation to U. S. Route 20 Sections, Jo Daviess and Stephenson Counties, Illinois –
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Figure 2-2: Karst Features in Relation to U. S. Route 20 Sections, Jo Daviess and Stephenson Counties - T:\IDOT\1283\Reports\EIS\Condensed Final EIS\Figures\Figure 2-2.dgn

Figure 2-3: Aquifer Sensitivity Classifications In Relation to U. S. Route 20 Sections, Jo Daviess County, Illinois - T:\IDOT\1283\Reports\EIS\Condensed Final EIS\Figures\Figure 2-3.dgn

Surface Water Quality

The waterbodies of the project area are subject to the General Use water quality standards. The Designated Uses in the project area include, aquatic life, fish consumption and swimming uses. **Of the 28 streams and their tributaries in the project area, only six of these streams (Galena River, Apple River, Furnace Creek, Yellow Creek, Unnamed Tributary of Waddams Creek, and the Pecatonica River) have been assessed for water quality by Illinois EPA (Water Quality Report 2002). Four of these streams are listed as being in partial support of their designated uses, and therefore, are considered to be impaired streams.**

Waters that are impaired are identified on a list, referred to as the Section 303(d) list (IEPA 2003). Waters identified on this list are subject to the development of Total Maximum Daily Loads (TMDL). The TMDL is the sum of the allowable amount of a single pollutant that a water body can receive from all contributing sources and still meet water quality standards and designated uses. In most cases, IEPA employs contractors to develop TMDLs and they are developed in conjunction with local involvement, which incorporate regulatory, voluntary and incentive-based approaches with existing applicable laws and programs (IEPA 2003). The impaired streams in the project area are currently scheduled for TMDL implementation in 8 to 13 years.

Currently four streams (Galena River, Apple River, Yellow Creek, and the Pecatonica River) are listed as having impairments in the Illinois Water Quality Report 2002 (IEPA 2002). The Galena River is in partial support of its aquatic life and fish consumption designated uses. It is also in nonsupport of its swimming designated use. The potential causes of the impairment are from pH, PCB's, pathogens, habitat alteration (other than flow), and suspended solids. The potential sources of these impairments are from pasture land, urban runoff/storm sewers, channelization, and unknown sources. The Apple River is in partial support of its fish consumption designated use and in nonsupport of its swimming use. The potential cause of the impairment is pathogens from unknown sources. Yellow Creek is in partial support of its aquatic life designated use. The potential causes of the impairment are nitrates from non-irrigated crop production and pasture land. The Pecatonica River is in partial support of its fish consumption designated use. The potential cause of this impairment is PCB's from unknown sources.

2.10 Floodplains

In the development of a Federally funded/regulated project, Executive Order 11988 (Flood Plain Management) imposes special requirements when the project will entail a significant floodplain encroachment. These are in addition to the IDNR Office of Water Resources floodplain requirements. The proposed project crosses the floodplains of ten streams. These floodplains have been designated by the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps. These floodplains are depicted on these maps as zone A (areas of 100-year flood; base flood elevations and flood hazard factors not determined). The streams having base floodplains in the project area are described in Table 2-1. These areas are depicted in Appendix K of the DEIS. No regulatory floodways are located in the project area.

2.11 Wetlands

The 1987 U.S. Army Corps of Engineers Wetland Delineation Manual was used to delineate the wetlands in the project area. Wetlands within the project area were identified during field surveys conducted in 1994 and 1999. All potential wetlands in the project area were examined and 238 routine onsite wetland determinations were performed in the project area. A total of 203 individual sites or complexes were identified as jurisdictional wetlands. Approximately 91.6 hectares (226.3 acres) of jurisdictional wetlands occur in the project area. The size range for wetlands in the project area is from 0.02 to 2.77 hectares (0.06 acre to 6.84 acres).

Seven wetland communities have been identified in the project corridor. These and the number of sites in parenthesis are as follows: Farmed wetland (2), wet meadow (70), sedge meadow (48), marsh (5), wet shrubland (5), pond (61) and forested wetland (12). **The Floristic Quality Index (FQI) of the wetlands in the project area ranged between 0.4 and 35.1. An FQI score below 10 suggests a site of low natural quality, while a score below 5 may denote a highly disturbed site. An FQI value above 20 suggests that a site has evidence of native character and may be considered an environmental asset. Of the 203 wetlands in the project area, 35 have FQI's below 5, 66 have FQI's between 5 and 10, 55 between 10 and 15, 24 between 15 and 20, and 20 have FQI's over 20. Individual wetland descriptions including species composition, soil type, plant community type, hydrological indicators and FQI are depicted in Table 2-21 of the Draft EIS.**

2.12 Special Waste

A Preliminary Environmental Site Assessment (PESA) was conducted by the Illinois State Geological Survey (ISGS) in 2001 (updated September 2004) along the project corridor for each of the Alternates. This area was characterized as a high risk for the occurrence of regulated substances based on the presence of volatile organic compounds (VOCs) substantially above background levels in the headspace of soil samples taken from boreholes at the Amoco Pipeline on U.S. Route 20 and Wards Grove Township Garage and Maintenance Facility.

The PESA identified ten properties of environmental concern. Three of these properties are of concern because there is a registered underground storage tank present.

Evidence from aerial photographs, historical topographic maps and site visits indicates that some buildings along the project right of way were constructed before 1979 and may therefore have asbestos-containing materials as components in floor tile, wall and pipe insulation, roofing material, patching or paint compounds, ceiling materials and stove/furnace insulation. Asbestos discovered in any buildings to be demolished will require special removal prior to demolition.

The USEPA listing of potential, suspected, and known hazardous waste or hazardous substance sites in Illinois (i.e., the Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS)) was reviewed to ascertain whether the proposed project will involve any listed site(s). As a result of this review, it has been determined that the proposed undertaking will not require any right-of-way or any easement from a site included in the CERCLIS listing as of August 20, 2004.

2.13 Biological Resources

The project area lies within portions of the Wisconsin Driftless Division and the Freeport Section of the Rock River Hill Country Natural Divisions of Illinois. Within the project area, the Driftless

Division has also been designated by IDNR as a Resource Rich Area (RRA). The Driftless Resource Rich Area covers approximately 777 square kilometers (300 square miles) in Northwestern Illinois on and around the Mississippi River in Jo Daviess, Carroll, and Whiteside Counties. The project corridor traverses a portion of this area between Stockton and Tapley Woods Land and Water Reserve. The Resource Rich Areas is an Illinois DNR program that identifies large areas containing concentrated natural resources (forests, wetlands, natural areas/nature preserves and biologically important streams) in order that cooperative public-private partnerships can be formed that merge natural resource stewardship with compatible economic and recreational development.

The Wisconsin Driftless Division was never glaciated during the Pleistocene era and consists of steep rolling hills with erosional features such as stream valleys. Limestone and dolomite occur in the road cuts and are scattered throughout the upland forests. Soils in this division consist of wind-blown loess, thicker on the east side of hills, and thinnest at the top of ridges. In areas of thin soils, bedrock dolomite hill prairies can be found. Most areas within the division have been altered for agricultural purposes to non-native grassland, hay, or row crops.

The Freeport Section includes most of the Rock River Hill Country Division. It is characterized by rolling hills and the presence of dolomite and limestone bedrock. Limestone caves are present. The Rock River Hill Country subsection is an area of steep, dissected topography, which also contains broad outwash plains. Soils are often thin, developed from a recent silt-loam cap of loess over old Altonian- and Illinoian-age glacial drift. Agricultural land and grassland are the predominant cover types.

Biological surveys in the project area were conducted over a period of several years in order to assess wetlands, riverine and upland habitat communities, wildlife resources and the occurrence of potential habitat for threatened and endangered species.

Cover Types/Habitat

The project area covers 272 square kilometers or 27,224 hectares (67,270 acres). Nineteen cover types were mapped within the project area. Three cover types (agricultural land, hayland, and pasture) account for 77.1 percent of the lands within the project area. The most common type of natural community in the project area is upland forest, which comprises 15.2 percent of the total area. **Developed land (residential, commercial, industrial) accounts for 6.1 percent of the lands within the project area. The remaining fourteen cover types make up less than three percent of the project area. A summary of cover type acreage's in the project area are given in Table 2-22 of the DEIS.**

Upland forests cover approximately 4,130 hectares (10, 200 acres) or 15.2 percent of the project area. The majority of the forests lie between Galena and Elizabeth (Jo Daviess County). These forested areas occur mainly on the ridges and parcels range in size from 8.1 hectares (20 acres) to 404.7 hectares (1000 acres) in size. Most of the sites have been or are currently being disturbed by grazing, logging or cutting for fuel and housing developments. Because of these past and present disturbances, specific forest sites differ in their species composition, density, size and age class. Generally, these forests are dominated by red and white oaks and shagbark hickories on the drier sites and sugar

TABLE 2-1
DESIGNATED 100-YEAR FLOODPLAINS WITHIN THE PROJECT AREA

Alternate Section	Stream	Sheet No.	Approximate Average Width of 100-Year Floodplain		Cover Type(s)*
			Meters	Feet	
A-B	Galena River	5	293	960	2, 4, 22
A-B	Small Pox Creek	9, 10	168	550	13
B-D	Apple River	23, 24	472	1,550	4, 22
B-F	Furnace Creek	28, 29	180	590	2, 3
B-F	Furnace Creek	30	375	1,230	2, 3, 5
B-F	Apple River	32	244	800	4, 22
C-D	Apple River	38	530	1,740	2, 3, 4, 22
C-I	Apple River	39	143	470	4, 22
C-I	Wolf Creek	40	884	2,900	2, 4
C-I	Wolf Creek	41	363	1,190	2, 4
C-I	Yellow Creek Tributary A	53	79	260	4, 8
C-I	Yellow Creek	54, 55	232	760	2, 4, 5
C-I	Yellow Creek Tributary B	55	43	140	2, 4
C-I	Yellow Creek Tributary B	55, 56	177	580	2, 4
D-E	Wolf Creek	61	344	1,130	2, 4
H-J	Yellow Creek Tributary A	93	155	510	4, 13
H-J	Yellow Creek	94	427	1,400	2, 4
H-J	Yellow Creek Tributary D	94	34	110	4
H-J	Yellow Creek Tributary D	94	55	180	4
H-J	Yellow Creek Tributary D	94	49	160	4
I-K	Unnamed Tributary to Pecatonica River	108	64	210	4, 5
J-K	Unnamed Tributary to Pecatonica River	114	244	800	2, 4, 5

**** Code***

2	Pasture
3	Hayfield
4	Agricultural Land
5	Developed Land
8	Non-native Grassland
13	Floodplain Forest
22	River

Note: Sheet Nos. refer to sheets contained in Exhibits.
Source: The Louis Berger Group, Inc. 2002.

maple on the wetter sites. Other dominants include bur oak, black locust, white ash, black walnut, bitternut hickory and wild black cherry. The distribution of upland forest was depicted in Appendix O of the DEIS. Species composition, density, basal area, age class, and disturbance factors associated with forested areas are given in Table 2-24 of the DEIS. The Upland Forest cover type contains habitat for many species of amphibians, reptiles, birds, and mammals.

Prairie covers approximately 38 hectares (93 acres) or 0.001 percent of the project area. Because these areas are small in size and widely distributed and disturbed they do not provide much in the way of wildlife habitat. Their significance is related to their rarity and in some cases, to their plant species composition. Two types of prairie occur in the project area – dolomite hill prairie and mesic prairie. The dolomite hill prairie occurs scattered on the bluffs on the west side of the Galena River. Within the project area three dolomite hill prairies range in size between 1.24 hectares (3.1 acres) and 6.49 hectares (16 acres). The dominant species in these areas are little bluestem and eastern red cedar. These sites contain small numbers of uncommon plant species such as lead plant (*Amorpha canescens*), hoary puccoon (*Lithospermum canescens*), and prairie hummock sedge (*Carex richardsonii*). The state listed plant species, Inland New Jersey Tea, occurs at two of these sites. Mesic prairie remnants occur along railroad and roadway rights-of-way throughout the project area. None of these sites support rare species or intact, high quality prairie vegetation. These sites are dominated by little bluestem, big bluestem and a number of weedy Eurasian species.

Invasive Species

Approximately 27.5 percent of the state's flora is composed of alien (introduced) plant species. The Illinois Noxious Weed List contains several plant species (Canada and musk thistle) that occur in the project area. Invasive or nuisance species can establish themselves in rights-of-way during initial highway construction or afterwards due to maintenance practices. Because the proposed project may be located on new alignment, there is the possibility that it will introduce noxious and nuisance species to areas where they currently do not exist within the right of way. The Department will continue to implement the noxious and nuisance weed control programs along the new right of way.

Wildlife Resources

Amphibians and Reptiles

Fourteen species of amphibians and reptiles were observed during the field surveys of the project area. More than half of the land within the project area is agricultural and the majority of the remaining acreage is in pasture. However, there are still widely scattered areas of suitable habitat for amphibians and reptiles in the project area, particularly in the western portion where the rugged terrain has protected large tracts of land from disturbance. The most important habitat area for herpetofauna is associated with the Irish Hollow wetlands. The Irish Hollow wetland complex in the southwestern portion of the project area provides suitable habitat for a variety of reptiles and amphibians. This complex of seeps, flooded ditches, cattail marshes, ponds and larger waterbodies parallel Irish Hollow Creek for approximately 3 kilometers (1.9 miles). Seven species of amphibians and reptiles were recorded from this site.

Birds

A total of 52 species of birds were observed during the breeding season in the project area. Several of these species are Neotropical migrants, species of birds that breed in Illinois and winter in Latin America. Within the forested area of the project area 11 Neotropical migrants were identified during the breeding season (yellow-billed cuckoo, white-breasted nuthatch, wood thrush, red-eyed-vireo, common yellowthroat, chestnut-sided warbler, blackpoll warbler, ovenbird, scarlet tanager, American redstart and yellow-throated vireo). **In addition, several Neotropical migrants (cerulean warbler *(Dendroica cerulean)*, Kentucky warbler, hooded warbler) have been known to breed in Tapley Woods Land and Water Reserve, adjacent to the project area.**

Mammals

Agricultural land interspersed with woodland, shrubland and grassland will provide habitat for a variety of common wildlife species. Most of the recorded species are habitat generalists (Hoffmeister 1989). Twenty-four mammal species were observed within the project area. Many were observed in both forested and agricultural areas and appeared to be widespread throughout the project area.

Threatened and Endangered Species

Federally-Listed Species

The U.S. Fish and Wildlife North Central Region "Redbook" lists the bald eagle *(Haliaeetus leucocephalus)*, Indiana bat *(Myotis sodalis)*, Iowa Pleistocene snail *(Discus macclintocki)*, Karner blue butterfly *(Lycaeides melissa samuelis),* Higgens' eye pearly mussel *(Lampsilis higginsii)*, and eastern prairie fringed orchid *(Plantanthera leucophaea)* as occurring in Jo Daviess and/or Stephenson Counties, Illinois. These species were discussed in the DEIS. **The U.S. Fish and Wildlife letter dated June 17, 2003, indicates that the DEIS adequately addressed species protected by the Endangered Species Act. The U.S. Fish and Wildlife County Distribution of Federally Listed Species in Illinois dated May 2003 lists the bald eagle *(Haliaeetus leucocephalus)*, Indiana bat *(Myotis sodalis)*, Iowa Pleistocene snail *(Discus macclintocki)*, and Higgens' eye pearly mussel *(Lampsilis higginsii)* as occurring in Jo Daviess County. No species are listed in Stephenson County.**

State-Listed Species

The Illinois Endangered Species Protection Board lists a number of animal and plant species as occurring in Jo Daviess, Stephenson and adjacent counties. Field surveys within the project area between 1993 and 1999 have identified the northern harrier *(Circus cyaneus)*, peregrine falcon *(Falco peregrinus)*, brown creeper *(Certhia americana)*, river otter *(Lutra canadensis)*, timber rattlesnake *(Crotalus horridus)*, drooping sedge *(Carex prasina)* and redroot *(Ceanothus herbaceous)* as occurring within the project area. **These species were discussed in the DEIS. The Illinois Endangered Species Protection Board adopted final changes to the Illinois list at its meeting on February 20, 2004. These revisions were incorporated into the amendments proposed to 17 Illinois Administrative Code 1010 which were published in the May 7, 2004, Illinois Register. The proposed amendments were adopted on August 31, 2004. The Board has delisted the brown creeper and the river otter. The peregrine falcon listing has been reassigned from endangered to threatened status.** None of the species will be impacted. **The Illinois Endangered Species Protection Board at their**

February 20, 2004, meeting added a number of species to the endangered and threatened species list. These revisions were incorporated into the amendments proposed to 17 Illinois Administrative Code 1010 which were published in the May 7, 2004, Illinois Register. The proposed amendments were adopted on September 1, 2004. Two of these species, Franklin's ground squirrel *(Spermophilus franklinii)* and cerulean warbler, have been reported from Jo Daviess County. The Franklin's ground squirrel is listed as a threatened species. The species is a true hibernator and is active (April to September) less than half the year. The squirrels are diurnal and spend less than ten percent of their life above ground (Hofmann 1999). Their most important habitat requirement is a tall, dense cover of grasses, forbs, shrubs, and even small trees; they avoid the short grass of closely grazed pastures or mowed areas. They often occur along railroad embankments and some roadsides. Mohr (1943) indicated that he had observed the ground squirrel at two locations in northwestern Jo Daviess County, but did not give specific locations. There has been no recent evidence that this species still occurs in Jo Daviess or Stephenson Counties.

The cerulean warbler is listed as a threatened species. The species is a Neotropical migrant and is rare and very sensitive to losses of forested areas. In Illinois, the warbler is restricted to tall, diverse floodplain forests or white oak dominated slopes. The species occurs with a greater frequency in larger (over 200 hectares (500 acres) in size) forest tracts and infrequent in wooded tracts less than 80 hectares (200 acres) in size. The species suffers from relatively high rates of nest parasitism by brown-headed cowbirds (Rosenberg et al. 2000). Nesting season dates for the warbler is identified in Table 4-10. The cerulean warbler has been identified as occurring in Tapley Woods.

Land and Water Reserves/Natural Areas

An Illinois Natural Area is an area of land in public or private ownership that has been identified by the Illinois DNR as having an important natural feature. Important features include high quality natural communities, endangered species sites, relict species sites, outstanding geologic and aquatic areas, or unique natural features, such as caves. One of these areas occurs within the project area. The Horseshoe Mound Geological Natural Area occurs 1.6 kilometers (1 mile) east of Galena (see Exhibits, Sheet 7). Approximately 4.5 hectares (16 acres) of this site is considered an outstanding example of a driftless area mound containing dolomite outcrops and a dolomite cliff community. **The IDNR letter dated July 18, 2003, indicated that the project as described in the DEIS will not have any adverse effect on Illinois Natural Area Inventory sites.**

The Register of Land and Water Reserves constitutes a land and water protection program wherein lands and waters supporting important natural heritage resources or archaeological resources are recognized and provided protection and management commensurate with the intent of the public in their long term protection and stewardship. Tapley Woods, owned and managed by the Illinois Department of Natural Resources, was registered as an Illinois Land and Water Reserve by the Illinois Nature Preserve Commission on August 3, 1999. **Tapley Woods is not a Section 4(f) resource.** This 105-hectare (259-acre) reserve consists of upland, slope, and ravine forest, with dolomite bedrock outcrops and associated springs. It is one of the best examples of the original upland and ravine forest of the Wisconsin Driftless Area of Illinois under state ownership. Tapley Woods supports breeding populations of area-sensitive forest wildlife species (Neotropical migrants), **a state-listed species (cerulean warbler)** and provides opportunities for hiking, nature study, wildlife watching, research and hunting. Tapley Woods is bisected by U.S. Route 20, with approximately 70 hectares (172 acres) of mesic upland forest with steep ravines, springs and seeps occurring on the northeast side of the highway. This tract

has a very diverse flora including one state-listed species (*Carex prasina*) and several rare plant species. Approximately 35 hectares (87 acres) of dry upland forest occurs on the southwest side of the highway and is slightly more disturbed and lacks springs and seep complexes. Although the ravines are similar in plant composition to the eastern side, the upland forest slopes are drier.

2.14 Visual/Aesthetics

The project area has a distinct visual character that has made U.S. Route 20 a popular and interesting scenic route. The project area consists of three distinct landscape zones that are established by major physiographic differences in topography and vegetation. These zones are Upland Ridges and Hollows, Rolling Hills and Valleys and Illinois Prairies. To establish a more detailed basis for evaluation, the existing visual environment was divided into smaller physiographic areas called rating units. Thirty-seven rating units were developed based on physiographic units 2.6 to 7.8 square kilometers (one to three square miles) in area. This served to accurately evaluate the scenic quality and sensitivity of the visual environment. Based on topography and viewpoint, viewsheds were used to define the limits of the visual environment.

Scenic Quality

Based on the fieldwork/inventory of scenic quality conducted in December of 1998, 37 landscape units were rated with a high, moderate or low rating based on the apparent quality of the visual resources relative to their physiographic region. Each of the 37 rating units was evaluated for viewer sensitivity. The results were presented at several public workshops by the Department for comment and review. Based on public input, the averaged scores were calculated to determine the final sensitivity level ratings.

The third element in the inventory and analysis was to define the viewpoints and viewsheds of the two major types of viewers in the project area. The two types of viewers that will be affected by the proposed project are Viewers of the road and Viewers from the road. To define the viewer's perspective, viewsheds were calculated using topography within the project area. The viewsheds depict the surface area visible from a given viewpoint or a series of viewpoints.

The final phase of the BLM methodology is the determination of Visual Resource Classes through a matrix process. Visual Resource Classifications are the means of synthesizing and drawing conclusions from the mapped information generated in the inventory. This process has yielded four Visual Resource Classes. Each Resource Class is given a list of recommendations for mitigation to be considered as a component of the final design. These recommendations are based on the value of the resource and the degree of acceptable alteration. A matrix of values was used to evaluate the mapped information listed above. Using Geographic Information System (GIS), a model was created that mathematically calculated conclusions by assigning values to each of the analysis maps.

The assigned values are based on certain recommendations as provided in the BLM guidelines and as a direct result of public input which was provided to the Department during the various public meetings and information centers which were held in the project area during various stages of project development. Input was also provided to the Department by the U.S. Route 20 Work Groups.

After each map was assigned values, these values were added together yielding four Visual Resources Classes. Resource classifications were calculated for the each of the Alternates providing a total of three Visual Resource Classification Maps. These maps would then be used in the development of recommended mitigation design measures.

Lighting

The proposed project will require the use of lighting. Lighting will be installed at each of the seven interchange locations (Illinois Route 84 north of Galena, Horseshoe Mound east of Galena, Devils Ladder, Illinois Route 84 northwest of Elizabeth, Woodbine, Illinois Route 78 at Stockton, Illinois Route 73 at Lena, and the Bolton Road at Elroy/Freeport). Partial interchange lighting will be installed at these interchanges. The lighting will consist of a few lamps located in the vicinity of some or all ramp terminals. The usual practice is to light those general areas where the exit and entrance ramps connect with the through traffic lanes of the freeway. The light source will be high pressure sodium (HPS) lamps. HPS lamps have excellent luminous efficiency, power usage, and long life. The HPS lamp produces a soft, pinkish-yellow light.

Apple River

The Apple River is listed as a candidate for wild and scenic status by the National Park Service. The river is approximately 88.5 kilometers (55 miles) in length. The Outstandingly Remarkable Values (ORV's) of the river include scenic, recreation, and geologic attributes. Apple River Canyon State Park occurs approximately 27.4 kilometers (17 miles) upstream of the project area. The Park receives an estimated 223,000 visitors per year (IDNR 2003).

The Scenic ORV's consist of landform, water, color, exemplary visual features and seasonal variations in vegetation. Overall it is a pretty river flowing through hill and farm country and down steep wooded valleys for much of its length to the Elizabeth area where the valleys widen out. The river is generally free flowing and meandering with moderate to heavily wooded corridors along it, (Thomas 2001). The river occurs within the driftless area of Illinois, an area where the bedrock surface has not been covered by glacial till. Water quality has been rated as good by the Illinois EPA, and is in compliance with many of its designated uses. Exemplary visual features include a pretty river flowing through hill and farm country and down steep wooded valleys for much of its length to the Elizabeth area. Seasonal variations in vegetation include fall color of the wooded valleys and the scattered stands of eastern red cedar on the crests of the bluffs during all times of the year, but most visible in the winter.

The Recreation ORV consists of fishing, boating, floating, sightseeing, wildlife observations, camping, hiking, and photography. Fishing is predominantly for small mouth bass, carp, bullhead and suckers. During springtime Apple River State Park is stocked with rainbow trout. Most of the river passes through private land, so permission to fish is required in most locations if you are outside the state park boundaries (Thomas 2001). Parts of the river can be floated and receives moderate floating pressure on it. Sightseeing, wildlife observations, camping, hiking, and photography undoubtedly are activities that occur.